
Game Dev @ BioWare

Career Development Report (Work Term 2)

APSC 210

University of British Columbia

Muchen He

Associate Developer, BioWare Edmonton

44638154

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Contents

0	Introduction	1
0.1	Outline	1
0.2	Scope	1
0.3	Industry	1
0.4	Company	1
1	Work Term Industry	3
1.1	Industry History	3
1.2	Economic Status	3
1.3	Geographics & Concentrations	4
1.4	Opportunities for Engineers	4
1.5	Employers in the Industry	5
1.6	Economic Factors	5
1.7	Political Factors	5
2	Obtained Skills	6
2.1	Technical Skills	6
2.1.1	Fundamental & Development Skills	6
2.1.2	Programming Skills	7
2.1.3	Specific Toolset Skills	8
2.2	Non-Technical Skills	8
3	Desired Future Industry	9
3.1	Choosing Desired Industry	9
3.2	Industry History	10
3.3	Economic Status	10
3.4	Geographics & Concentrations	10
3.5	Opportunities for Engineers	10
3.6	Employers in the Industry	10
3.7	Economic Factors	10
3.8	Political Factors	10
4	Technical & Transferable Skills for Senior Work Terms	11
4.1	Self-Marketable Skills	11
4.2	Skills Required to Succeed	11
4.3	Plan to Obtain	11
	Conclusion	12

List of Figures

1	BioWare logos	2
2	EA Earnings by Type	4
3	Video game as career	5
4	Cards used in agile methodologies here is depicted in the app, Trello	7

List of Tables

0 Introduction

0.1 Outline

This report serves to probe the progression of career development. This report is written with intent to achieve helping us gauge our current desired career path by reviewing the skills obtained throughout the work term, as well as future desired skills that would be necessary for future careers.

The report is broken down into four parts to help us understand what is it we need to proceed in our career development: industry in current work term, current skills being obtained, desired future industry, and transferable skills that might aid us reaching there.

The report will also briefly describe the company and the industry it takes position in. The studio that I work for is BioWare, which is a subsidiary of a larger publisher, Electronic Arts (EA).

0.2 Scope

The scope of report consists of analysis of skills and duty pertained to me and future desired skills. The report will not include details about the game, engine, or other technology used during the work term that helped me obtaining skills or reach my objectives.

0.3 Industry

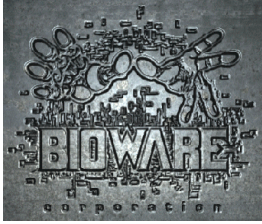
EA or BioWare, like many other studios or publishers exist in the market right now falls into the consumer entertainment industry. The products produced is associated with Microsoft and Sony as they develop the hardware the games will run on. Future industries I wish to work in consist of electronics development or robotics and control systems.

Work Term Industry (section 1) provides insight the industry with which we are currently working and competing in. This section outlines the company's position and its competitions in the gaming and or online entertainment and content delivery industry.

0.4 Company

BioWare is a game development studio founded in 1995 by three medical doctors in Edmonton, Alberta[3]. Since the establishment, BioWare has developed numerous titles including the Mass Effect and Dragon Age franchise as well as the massive multiplier online (MMO) game Star Wars: The Old Republic. BioWare is currently developing Anthem, the upcoming game set to release in February, 2019.

The company is now a division of EA, which is an American video game publishing company. This allows for cross-studio sharing of technology. Such as using the Frostbite engine (game engine developed by another EA studio, DICE, in Sweden) instead of using the in-house engine BioWare developed [4][5]. In 2018, BioWare went through rebranding that replaced the logos (figure 1).[3]



(a) BioWare logo in 1995



(b) BioWare logo prior to rebranding



(c) BioWare logo in 2018

Figure 1: BioWare logos

There is a pipeline of games the studio outputs, the latest one being Anthem, showcased at the Electronic Entertainment Expo (E3) in 2017 and 2018. The game so far has won many E3 awards.

To date, there are 800 active employees working at BioWare ranging from artists to programmers. My position is an associate developer on the UI/UX team for the game Anthem. Mostly developing engine tools, and elements the scriptwriters and artists can then use to add feature into the game.

1 Work Term Industry

BioWare is computer software company that develops video games for PCs, XBOX, and PlayStation. Thus we fall under *Services - Computer Programming / Software* industry.

We will also examine the video game industry in depth because of its relevance and size.

1.1 Industry History

The software industry primary focuses on developing computer programs as service (SaaS) or product that started in the 1950s. Recently, open source solutions and internet of things (IoT) are popular.[9]

The history of video game industry started in the 1970s when computers are powerful enough to run games even though videos existed since the 40s. Recently, the video game industry has expanded to many platforms including social media, mobile, augmented reality (AR) and virtual reality (VR).[13][14]

1.2 Economic Status

The video game industry economic status is growing as
Earlier games in the industry are generally cheap inexpensive to make because of small teams and low demand for quality from the consumers. In recent decades however, large budget games (A.K.A AAA or Triple A games) consists of large development teams and usually takes a year to three year to develop a single game. This is due to increased technological complexity.[12]

In 2017, the video game industry was valued at 17.68 billion USD. [14].

One competitor in the industry, Rockstar, and their most recent products Grand Theft Auto V (GTA 5) has become the most profitable product in the industry [1]. With a total revenue of \$6 billion, it has made "more money than any film, book, or game".

EA's earnings is as show below (figure 2)[6]. As shown, there is an increasing amount of income from "Live Services". This includes the after-sale content such as downloadable contents (DLCs) and micro-transactions (MTX) within the published games. Due to its financial appeal, Anthem will follow the same *live services* model. The game will feature purchaseable cosmetic items and will not have "loot-boxes" (more details in economic factors section).

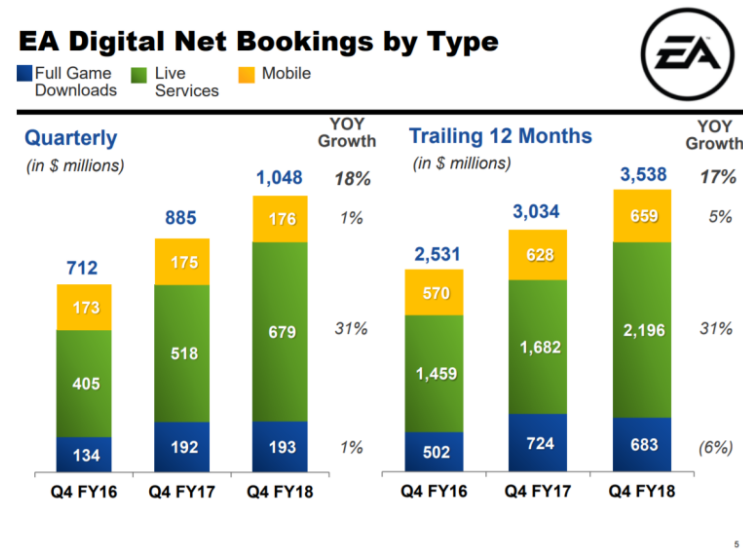


Figure 2: EA Earnings by Type

1.3 Geographics & Concentrations

The software industry is global. Industry leaders are based in USA. Because one can contribute to software from any computer, there is a large amount of freelancers or open-source contributors that can work from around the world.

The video game industry also applies worldwide. The USA is one of the largest producer of video games, most companies and publishers including Electronic Arts, Blizzard - Activision, and Valve (they own the world's largest online video game distribution platform - Steam [11]).

The largest market is China, with MMO games on PC being the largest category [15][16].

1.4 Opportunities for Engineers

For the video game industry, even though the products are viewed as entertainment or arts by the public, there are still many critical roles for engineers. According to Carlos Guerrero, a senior producer at EA, who had worked on games including World of Warcraft (WoW) and Overwatch, there are many technologies that goes into a game that need to be developed and maintained.

The following chart depicts various roles that goes into making a game (figure 3). In fact, the engineers make up a critical part: from video game engine development to online system infrastructure.

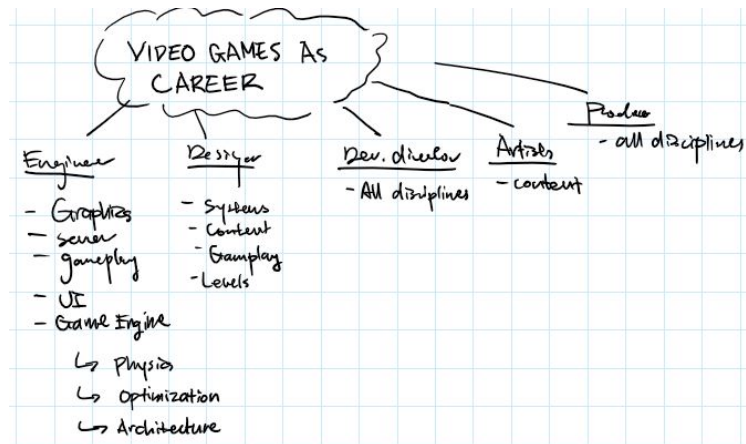


Figure 3: Video game as career

1.5 Employers in the Industry

For computer programming / software industry, the most notable industries include Microsoft, SAP, and ADP. Google and Amazon are also in the industry. Google is advertisement company with its parent company Alphabet owning several subsidiaries in AI research. Likewise, Amazon world's largest cloud computing service Amazon Web Services (AWS).

In the scope of the video game industry, EA is one of the biggest publisher in North America which owns subsidiaries including BioWare and DICE.

Another large video game publisher is from the giant Tencent, a Chinese internet company. They own Riot, a studio that developed League of Legends (LoL) which has 27 million players daily and an E-sports scene with over 11 million viewership.[7]

1.6 Economic Factors

This section intentionally left blank (not applicable).

1.7 Political Factors

This section intentionally left blank (not applicable).

2 Obtained Skills

This section provides an overview of my technical and non-technical skills gained at BioWare over the course of the work term.

Social skills: - Asking for help from anyone in the office - Participating in design review

2.1 Technical Skills

Being in a technical co-op position, the primary skills are comprised of technical skills in software development. The technical skills can be broken down into: fundamental and development workflow skills, programming skills,, and skills involving specific toolsets.

2.1.1 Fundamental & Development Skills

The first category of skills involves fundamentally useful abilities in a development studio.

To succeed in this position, one should be proficient in understanding and using version control solutions such as Git (most common) or Perforce (used in enterprise such as Google and EA). Version control is especially important as there are tens or hundreds of developers working on the same project or codebase. It is not uncommon that multiple files undergo “conflict” as the same file could be worked on by multiple developers. Therefore explicit version tracking and tools are vital to the workflow.

It is worth noting that since everyone is working off of the same depot that contains the source code and game data, if one were to break the build, everyone would be affected resulting in many work hours lost.

One should also be comfortable working with packages and modules (along with its associated package managers) since this makes the project more modular and encourages code reuse (for other licensees). Because of the modularity, one must make no assumptions about how future developers will use this code. Thus, it is important to test extensively, check errors, validate interfaces, and cover edge cases.

Moreover, familiarity with agile methodologies is useful in software development environment. Specific actions include code review, time management, and task management with cards (known as “JIRA” for EA internals). Each card contains a specific task and is assigned to each person. The card is placed in the person’s backlog, and is moved once the task on the card is done.

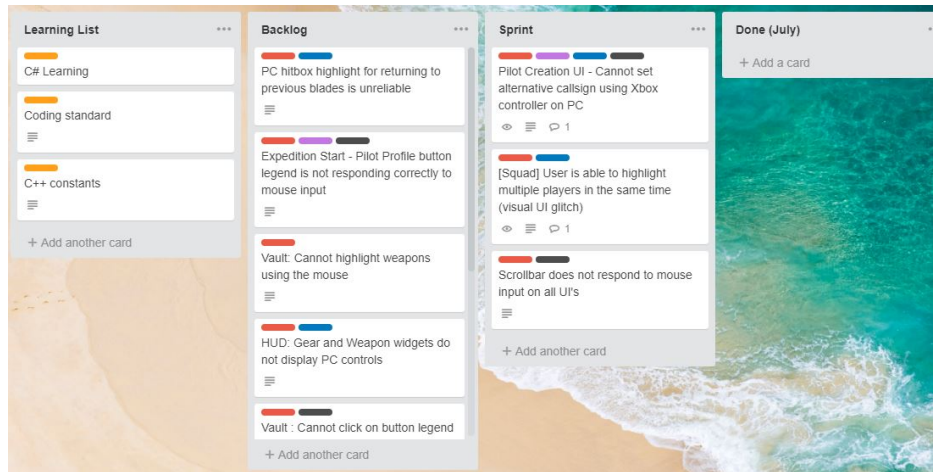


Figure 4: Cards used in agile methodologies here is depicted in the app, Trello

Lastly, contributing to technical documentation such as the development wiki (known as “confluence” internally). This can also be considered as a non-technical skill because it overlaps heavily with technical communications, a critical skill required in *any* industry.

2.1.2 Programming Skills

To success in the video game industry or computer programming industry with heavy emphasis on graphics and physics engines (used ubiquitously in video game production), one should be familiar with C++ the programming language. All AAA video games released in the recent decades are all programmed in C++ or made from game engines made in C++.

Of course, knowledge of any programming language including C or Python helps too as they are useful in specific situations (and they’re used widely in other fields of computer programming: Python is a “must-have” for AI or machine learning development).

At my position at EA, C++ is the logic behind everything in the game. C# is another programming language that is used widely in UI; it is also the most popular language in amateur game makers as it is used in the free game engine, Unity. We write in C# for the tools and editors the artists and designers use to make other game content, but ultimately they are “compiled” into C++. Finally, we write Python scripts to modify game content and assets in bulk.

In addition to the specific programming languages, it is also nice to be familiar with software concepts such as object oriented programming (OOP), UI/UX design patterns, multithreading to separate rendering and simulation, etc. More details will be in the next report (technical report for APSC 310).

Debugging skills and techniques are equally important. The most important skill is to create a conceptual map in mind of where the problem lies, how much or where it is affecting, and where it is coming from by eliminating possibilities. Other techniques include attaching IDE to processes and threads, setting breakpoints and analysing variables in the debugger.

Lastly, though it is obvious, it is important to keep in mind that future developers will likely see and use code we write. Writing code that complies with the coding standard, in terms of style of syntax and adding code comments and tags is beneficial.

2.1.3 Specific Toolset Skills

These specific toolset skills overlaps with technical skills. But skills involving specific toolsets emphasis on the learning skills. If one can learn, adapt, and use tool given in the development environment, it is and an indication of fast learner.

In the current industry of my position, it's useful to understand (at least in context) of what the program or tool is doing under the hood.

For instance, the developers use an engine editor called *FrostEd* to make games using the *Frostbite* engine. The editor is a propriatery and private software not distributed to the public, only to EA li-censees (game studios). Thus, it is important to learn how to use the editor independently as there lacks online resources, which contributes to enhancing independent learning skills.

FrostEd is a visual script editor and outputs game assets and schematics used to put together the game. As such, each asset contains references to data, logic, entities, and more. Understanding what was going on underneth these files has helped me greatly in understanding how the editor serializes the assets, and helped me working with the tool and more intuitive in debugging.

Perforce, the version control software as mentioned before is another case of skills in specific tools. This is because other companies may employ different version control software such as git.

2.2 Non-Technical Skills

The most important non-technical skill is learning independently as supervisors or team leads might not always have time to provide all details at all times. Especially if they're often busy.

One should always first read through the documentation. Often times, this action is often informally abbreviated as "RTFM" which stands for "Read The F-ing Manual!". It is also useful to build a mental map or a physcial map of how things fit together.

One should use critical thinking using first-principles to sovle problems. Which implies only thinking about what is absolutely true, then progress to what could have happened, then verify the hypothesis and repeat.

One important skill that does not get emphasised enough (because of its simplicity) is knowing how to Google (or whichever search engine one prefers). Knowing how to find resources and information online efficiently and accurately saves times can greatly accelerate the learning process.

Lastly, it is critical to be mentally healthy during work. Know when to take breaks and relief any frustration that arises during work. Induced frustration and stress often leads to decrease in productivity and cognitive functions.

3 Desired Future Industry

This section outlines my desired future industry to expand my career as well as details about the industry. First I will explore the possible desired industries I want to work at for future work terms.

3.1 Choosing Desired Industry

This sub-section intends to provide personal reflection on possible industries in my career progression.

Depth

I have two choices in mind. The first is software development or computer programming industry. This encourages depth as I already have a few work-terms worth of experiences. Choosing said industry also implies more work on in the UI/UX or app development (relatively front end and higher level) for its high demand. It could be a viable option that consolidates existing technical skills.

Possible specific industries include software development (for companies such as Microsoft, Amazon, and start-ups) and video game industry (such as coming back to Electronic Arts or explore other game publishers).

The benefit of choosing software industry is that I already possess many skills required to success in this industry. Thus, future job applications are more easier and more fitting. Allowing easier integration and on-boarding into teams of future opportunities.

The trade off being that my existing skills in this specific area, which consist of programming in C++, UI/UX and app development, will snowball. As a result, it will be more likely that my future positions be software developer. The career inertia could potentially make it more difficult to enter into other industries in case of career change.

Breadth

The second option is to explore industries that differs from pure high-level software development. Industries that could potentially be more related to the my study in electrical engineering. Such as to apply knowledge practiced in courses such as operating and designing electronics or PCBs, mechanical components, apply theories such as controls theory in hardware projects or robotics. The intent would be to try other tasks to expand my set of skills into positions of different industries.

Possible industries include electronic and hardware R&D or design and manufacturing. There are several companies that fall under this industry: Intel and Altera for hardware development such as field programmable gate array (FPGA) which are technologies explored in CPEN courses. Tesla for electric and battery engineering. DJI for drone develop or other robotic applications.

The benefit of this route is that to experience new positions, gain insight and additional interests. By expanding skill set, my technical experience is not fixated on software development.

For the scope of this report, I will explore the former as it is more plausible.

- 3.2 Industry History**
- 3.3 Economic Status**
- 3.4 Geographics & Concentrations**
- 3.5 Opportunities for Engineers**
- 3.6 Employers in the Industry**
- 3.7 Economic Factors**
- 3.8 Political Factors**

4 Technical & Transferable Skills for Senior Work Terms

4.1 Self-Marketable Skills

4.2 Skills Required to Succeed

4.3 Plan to Obtain

Conclusion

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